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## PATENT ABSTRACTS OF JAPAN

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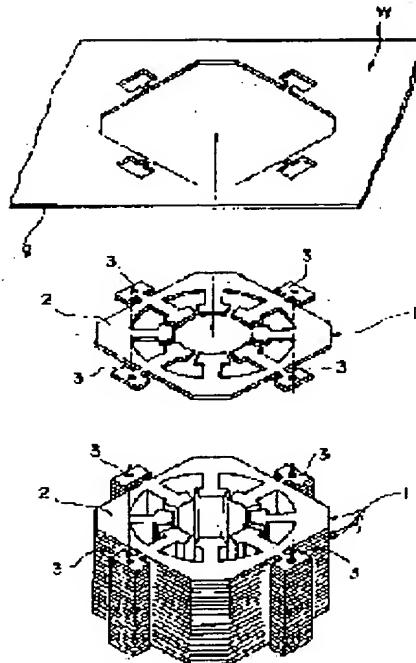
(72)Inventor : TORISU TOKUO

## (54) MANUFACTURE OF LAYERED CORE

## (57)Abstract:

**PROBLEM TO BE SOLVED:** To realize a manufacturing method of a layered core, by which a layered core composed of core sheets bonded to each other can be manufactured surely without deteriorating the dimensional accuracy and electrical characteristics.

**SOLUTION:** This manufacturing method of a layered core includes a process, in which a core sheet 1 which has a core sheet main part 2 and joint parts 3, is punched out of a belt-type steel plate W whose surface is coated with a thermosetting adhesive (g) and the core sheet 1 and another core sheet 1 adjacent to it are connected to each other by caulking their corresponding joint parts 3 with each other, a process in which, after a predetermined number of core sheets 1 have been connected to each other and layered, the thermosetting adhesive (g) is cured to bond the core sheets 1 to each other and a process, in which after the core sheets 1 have been bondedly coupled to each other, the joint parts 3 are removed from the core sheet main parts 2.



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## DETAILED DESCRIPTION

## [Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the manufacture approach of the layer-built iron core which carries out the glued connection of the pieces of an iron core which carried out the laminating, and changes.

[0002]

[Description of the Prior Art] Layer-built iron cores, such as a stator of a motor and a rotator, are manufactured by combining mutually the pieces of an iron core which pierced, formed and carried out the predetermined number-of-sheets laminating of the piece of an iron core of a predetermined configuration from ingredient plates, such as a band-like steel plate, with the metal mold equipment which possesses a die and punch and changes.

[0003] Although caulking association was conventionally adopted as a coupling means of the pieces of an iron core here, since distortion arose near the caulking part in the piece of an iron core, it combined with a clearance being made among the pieces of an iron core by which the laminating was carried out, and there was un-arranging [ which is that the caulking part exists in the layer-built iron core as a product, and has a bad influence on the electrical characteristics in a layer-built iron core ].

[0004] After carrying out the predetermined number-of-sheets laminating of the piece of an iron core pierced and formed in the front face from the ingredient plate with which thermosetting adhesive was applied inside the die in metal mold equipment in order to cancel such un-arranging, the manufacture approach of a layer-built iron core to which the glued connection of the pieces of an iron core by which the laminating was carried out is carried out is offered by heating at the heater formed in the die and stiffening thermosetting adhesive.

[0005]

[Problem(s) to be Solved by the Invention] By the way, although the piece of an iron core pierced and formed from the ingredient plate in the manufacture approach of the layer-built iron core mentioned above is accumulated one after another and goes in the interior of a die The pieces of an iron core accumulated at this time have a possibility that a clearance may be generated without the pieces of an iron core sticking since it is not combined at all. When the glued connection of the pieces of an iron core was carried out in the condition that the clearance is generated between the pieces of an iron core, deviation not only arises in the dimensional accuracy of a layer-built iron core, but there was un-arranging [ which has a bad influence also on electrical characteristics ].

[0006] It is in the purpose of this invention offering the manufacture approach of a layer-built iron core that the layer-built iron core which carries out the glued connection of the pieces of an iron core which carried out the laminating, and changes can be manufactured certainly, without causing the fall of dimensional accuracy or electrical characteristics, in view of the above-mentioned actual condition.

[0007]

[Means for Solving the Problem] The manufacture approach of the layer-built iron core in connection with this invention in order to attain the above-mentioned purpose While piercing and forming in a front face

the piece of an iron core which has the piece body section of an iron core which constitutes a layer-built iron core, and the joint projected from this piece body section of an iron core from the ingredient plate which applies thermosetting adhesive and changes After it connects mutually the piece of an iron core of predetermined number of sheets and it carries out a laminating to the process which connects mutually other pieces of an iron core which contact the piece of an iron core which carried out blanking formation, and this piece of an iron core by carrying out caulking association of each joint, by stiffening thermosetting adhesive The process which carries out the glued connection of the piece of an iron core of the predetermined number of sheets by which the laminating was carried out mutually, and the process which removes a joint from the piece body section of an iron core after carrying out the glued connection of the pieces of an iron core of predetermined number of sheets mutually are included.

[0008]

[Embodiment of the Invention] Hereafter, this invention is explained to a detail based on the drawing in which an example is shown. Drawing 1 thru/or drawing 7 show the example which applied the manufacture approach of the layer-built iron core in connection with this invention to manufacture of the stator (layer-built iron core) in a motor. In addition, it cannot be overemphasized that the manufacture approach of the layer-built iron core in connection with this invention is enforced in the metal mold equipment equipped with a die and punch which is not illustrated.

[0009] By the manufacture approach of the layer-built iron core in connection with this invention, as shown in drawing 1, the piece 1 of an iron core of a predetermined configuration is first pierced and formed from the band-like steel plate W as an ingredient plate.

[0010] here -- the above-mentioned band-like steel plate W -- the front face (rear face) -- for example, the thermosetting adhesive g of an epoxy resin system -- the whole surface -- continuing -- \*\*\*\* -- it is applied thinly.

[0011] On the other hand, the above-mentioned piece 1 of an iron core consists of the piece body section 2 of an iron core, and four joints 3, 3, 3, and 3, as shown in drawing 1 and drawing 2.

[0012] The piece body section 2 of an iron core is a part which constitutes the layer-built iron core 100 (refer to drawing 5) as a product, and while presenting the appearance of the shape of a square which the corner lacked, much salient pole child 2a and 2a-- are prepared in the center section.

[0013] Moreover, each joint 3 is formed in the mode which projects from each side of the piece body section 2 of an iron core, and consists of thin rib 3b which connects caulking section 3a which presents the shape of a rectangle, this caulking section 3a, and the piece body section 2 of an iron core. In addition, the width of face of the above-mentioned rib 3b is set to board thickness extent of the band-like steel plate W, and this example. It is set as 0.5mm - 0.7 mm.

[0014] As shown in drawing 1, while piercing and forming the piece 1 of an iron core of a predetermined configuration from the band-like steel plate W by the manufacture approach of this invention The laminating of this piece 1 of an iron core by which blanking formation was carried out was carried out to other pieces 1 of an iron core which pierce previously, are formed and are held in the die (not shown), and the piece 1 of an iron core by which blanking formation was carried out, and other pieces 1 of an iron core are mutually connected by carrying out caulking association of each joint 3 (caulking section 3a) comrades.

[0015] That is, the laminating to other iron core plates 1 and caulking association with other pieces 1 of an iron core are carried out at the same time it pierces and forms the piece 1 of an iron core.

[0016] Pieces 1 and 1 of an iron core of the predetermined number of sheets which repeats blanking formation of the piece 1 of an iron core from the band-like steel plate W, and constitutes a layer-built iron core 100 hereafter -- A laminating is carried out.

[0017] Here, since caulking association of the piece 1 of an iron core by which the laminating was carried out, and the piece of iron core 1 comrades of 1 -- which the layer of thermosetting adhesive g intervenes in between, and adjoin each other is mutually carried out as shown in drawing 3, thermosetting adhesive g has been stuck to the front face of the piece 1 of an iron core.

[0018] In addition, since there is no place which the configuration for making it dissociate with the piece 1

of an iron core of the predetermined number of sheets which constitutes one layer-built iron core 100, and the iron core plate of 1 -- which constitutes other layer-built iron cores for the lowest and top iron core plate 1 inside changes with the conventional manufacture approach, explanation is omitted.

[0019] At the piece 1 of an iron core of predetermined number of sheets, and the heater for heating (not shown) which installed 1 -- in the interior of the die in metal mold equipment after carrying out a laminating, by stiffening thermosetting adhesive g, the glued connection of the piece 1 of an iron core and 1 -- by which the laminating was carried out is mutually carried out to one, and the \*\*\* assembly 10 shown in drawing 4 is manufactured.

[0020] Subsequently, after picking out an assembly 10 from metal mold equipment (not shown), each joint 3 and 3 -- are removed from the piece body section 2 of an iron core in this assembly 10. Here, since each joint 3 and 3 -- are only connected with the piece body section 2 of an iron core through thin rib 3b, they can fold a joint 3 easily from the piece body section 2 of an iron core by scooping out caulking section 3a and fracturing rib 3b.

[0021] thus, \*\*\* shown in drawing 5 by removing each joint 3 and 3 -- from the piece body section 2 of an iron core of an assembly 10 -- the layer-built iron core 100 as a final product is completed.

[0022] As mentioned above, by the manufacture approach in connection with this invention Since caulking association of this piece 1 of an iron core is carried out with other iron core plates 1 at the same time it pierces and forms the piece 1 of an iron core from the band-like steel plate W, piece of iron core 1 comrades which adjoin in the condition of having carried out the laminating The fall of the dimensional accuracy and electrical characteristics resulting from sticking mutually through thermosetting adhesive g, and having and the pieces of an iron core having not stuck can be prevented beforehand.

[0023] Moreover, since each joint 3 and 3 -- by which caulking association is carried out are removed from the piece body section 2 of an iron core of an assembly 10 as mentioned above, the bad influence to the electrical characteristics in a layer-built iron core which a caulking part does not exist in the layer-built iron core 100 as a product, have, and originate in existence of a caulking part does not occur.

[0024] Moreover, in the example mentioned above, it is heating at the heater installed in the interior of a die in order to carry out the glued connection of the piece 1 of an iron core and 1 -- by which the laminating was carried out mutually, but since caulking association connects with one, it takes out from metal mold equipment and the piece 1 of an iron core and 1 -- by which the predetermined number-of-sheets laminating was carried out can be heated.

[0025] Thus, by taking out the piece 1 of an iron core and 1 -- by which the predetermined number-of-sheets laminating was carried out from metal mold equipment, and heat-treating them, a layer-built iron core can be manufactured without needing special metal mold equipment equipped with the heater for heating, and it becomes possible to have and to suppress enlargement of a manufacturing facility, and increase of a manufacturing cost as much as possible.

[0026] Piece of iron core 1' shown in drawing 6 and drawing 7 consists of piece body section of iron core 2', four joint 3', and 3'--. While piece body section of iron core 2' presents a square-like appearance, much salient pole child 2a' and 2a'-- are prepared in the center section. Each joint 3' consists of caulking section 3a' which presents the shape of a rectangle, and thin rib 3b', and each joint 3' is projected and formed from crevice 2b' prepared each side of piece body section of iron core 2'. In addition, the width of face of above-mentioned rib 3b' is set to board thickness extent of the band-like steel plate W, and this example. It is set as 0.5mm - 0.7 mm.

[0027] Here, there are not the manufacture approach of a layer-built iron core which also showed the manufacture approach of the layer-built iron core which used piece of iron core 1' mentioned above in drawing 5 from drawing 1 , and a changing place, and they can prevent beforehand the dimensional accuracy of the layer-built iron core as a product, and the fall of electrical characteristics.

[0028] Furthermore, in piece of iron core 1' of the configuration mentioned above, when joint 3' is removed from the ordinary state of drawing 7 (a) like drawing 7 (b) and it holds a layer-built iron core in casing since folded rib 3b' does not project from rim 2c[ of piece body of iron core 2' ], interference with casing and a layer-built iron core can be prevented.

[0029] From crevice 2b" prepared each side of 2" of piece body sections of an iron core, 3" of joints which consist of caulking section 3a" and rib 3b" of a neck configuration projects, they are formed, and 1" of iron core pieces shown in drawing 8 does not have piece of iron core 1' shown in drawing 6 and drawing 7 except the configuration of the 3" of the above-mentioned joints, and the place which changes fundamentally. In addition, the width of face of the above-mentioned rib 3b" is set to board thickness extent of the band-like steel plate W, and this example. It is set as 0.5mm - 0.7 mm.

[0030] Here, there are not the manufacture approach of a layer-built iron core which also showed the manufacture approach of the layer-built iron core which used 1" of iron core pieces mentioned above in drawing 5 from drawing 1, and a changing place, and they can prevent beforehand the dimensional accuracy of the layer-built iron core as a product, and the fall of electrical characteristics.

[0031] moreover -- having mentioned above -- a configuration -- an iron core -- a piece -- one -- " -- \*\*\* -- drawing 8 -- (a) -- an ordinary state -- from -- drawing 8 -- (b) -- like -- a joint -- three -- " -- having removed -- the time -- breaking -- taking -- having had -- a rib -- three -- b -- " -- an iron core -- a piece -- a body -- two -- " -- it is -- a rim -- two -- c -- " -- from -- projecting -- things -- there is nothing -- since -- a layer-built iron core -- casing -- holding -- a case -- interference with casing and a layer-built iron core -- it can prevent .

[0032] Moreover, in 1" of iron core pieces mentioned above, since 3" of joints is only connected with 2" of piece bodies of an iron core through rib 3b" of a neck configuration, the process which removes 3" of joints from 2" of piece body sections of an iron core can be carried out very easily by fracturing rib 3b".

[0033] In addition, although the piece of an iron core which consists of the square-like piece body section of an iron core and four joints which constitute an abbreviation square pole-like stator was illustrated in the example mentioned above, it is also possible to prepare the joint of the number in the disc-like piece body section of an iron core which constitutes the stator of an approximate circle column configuration suitably, and to constitute the piece of an iron core.

[0034] That is, the joint which the configuration of the piece body section of an iron core in the piece of an iron core is determined based on the configuration of the layer-built iron core which is going to manufacture, and is prepared in the piece body section of an iron core can be suitably set up based on various conditions, such as a configuration of the piece body section of an iron core.

[0035] Moreover, it cannot be overemphasized that the manufacture approach of the layer-built iron core in connection with this invention can be effectively applied as an approach for manufacturing the layer-built iron core of various gestalten, such as a layer-built iron core of not only the stator and rotator of a motor but an I-beam or E mold.

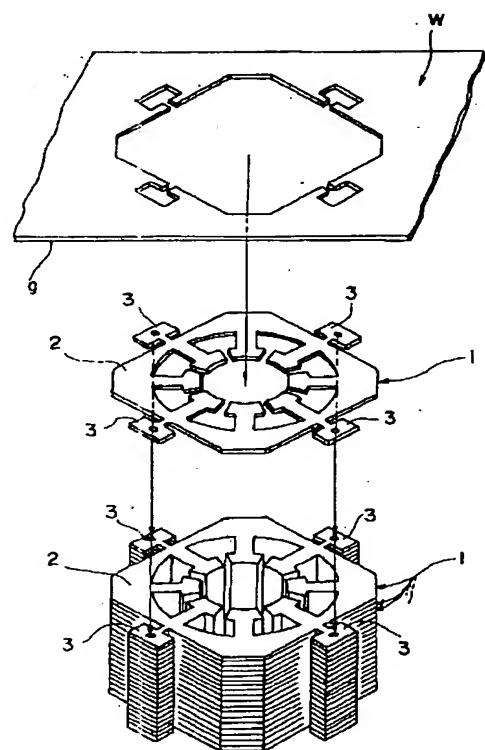
[0036]

[Effect of the Invention] As explained in full detail, as mentioned above, the manufacture approach of the layer-built iron core in connection with this invention While piercing and forming in a front face the piece of an iron core which has the piece body section of an iron core which constitutes a layer-built iron core, and the joint projected from this piece body section of an iron core from the ingredient plate which applies thermosetting adhesive and changes After it connects mutually the piece of an iron core of predetermined number of sheets and it carries out a laminating to the process which connects mutually other pieces of an iron core which contact the piece of an iron core which carried out blanking formation, and this piece of an iron core by carrying out caulking association of each joint, by stiffening thermosetting adhesive The process which carries out the glued connection of the piece of an iron core of the predetermined number of sheets by which the laminating was carried out mutually, and the process which removes a joint from the piece body section of an iron core after carrying out the glued connection of the pieces of an iron core of predetermined number of sheets mutually are included. Since according to the above-mentioned configuration this piece of an iron core and other iron core plates are connected by caulking association at the same time it pierces and forms the piece of an iron core from an ingredient plate, the pieces of an iron core which overlap in the condition of having carried out the laminating will be mutually stuck through thermosetting adhesive, without producing an unprepared clearance. Therefore, according to the manufacture approach of the layer-built iron core in connection with this invention, it becomes possible to

manufacture certainly the layer-built iron core which carries out the glued connection of the pieces of an iron core which carried out the laminating, and changes, without causing the fall of dimensional accuracy or electrical characteristics.

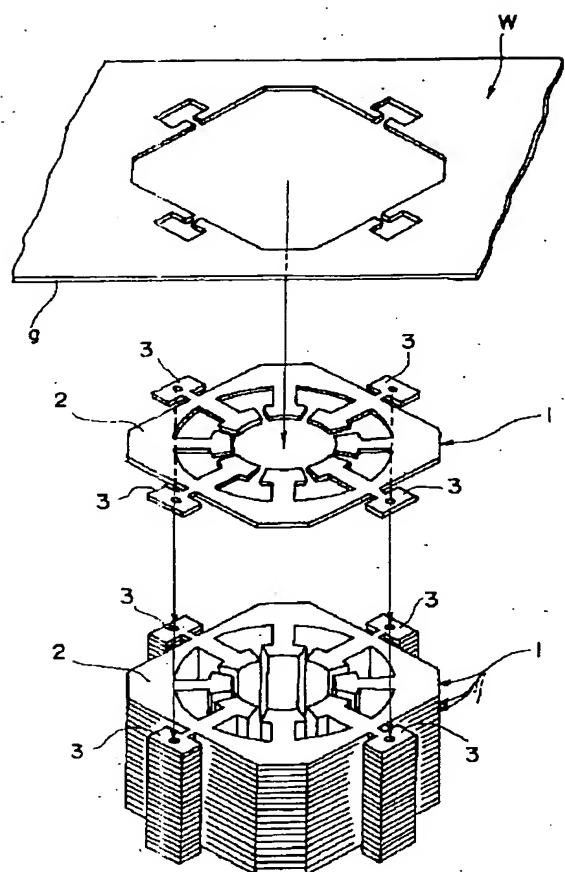
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### Drawing selection Representative drawing



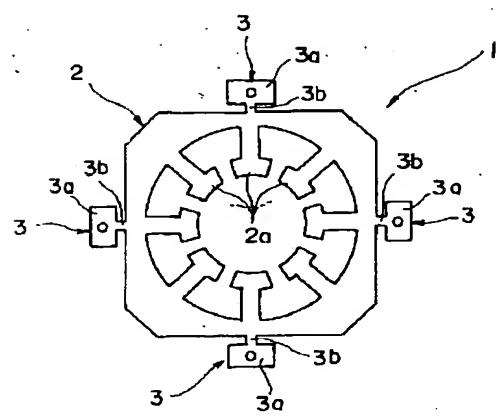
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Drawing selection drawing 1



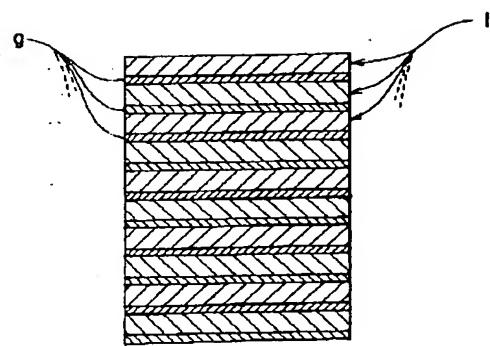
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Drawing selection drawing 2



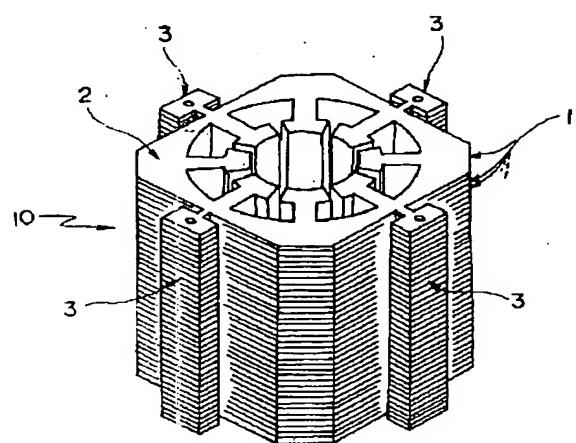
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Drawing selection drawing 3



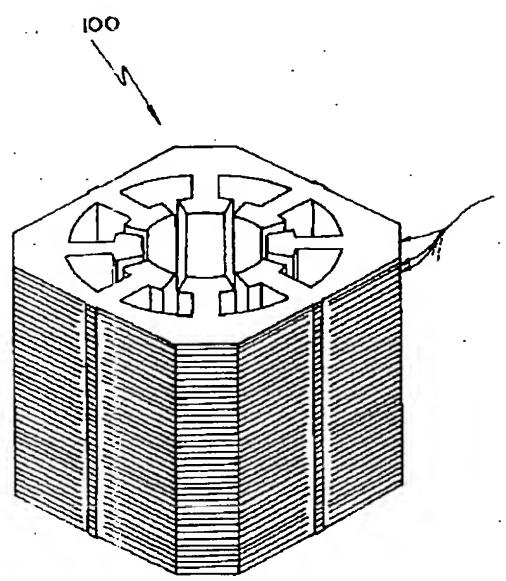
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Drawing selection drawing 4



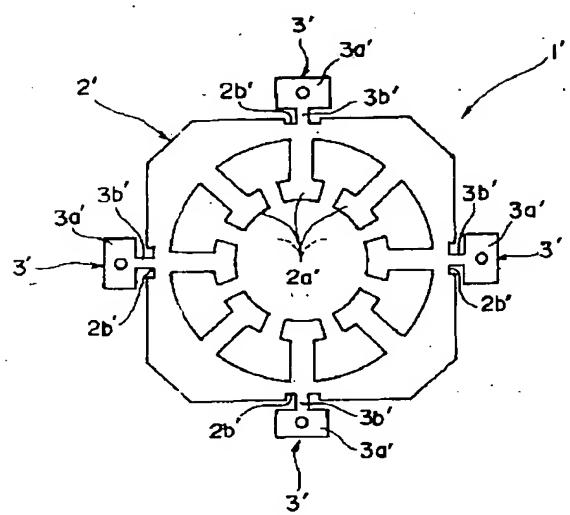
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Drawing selection drawing 5



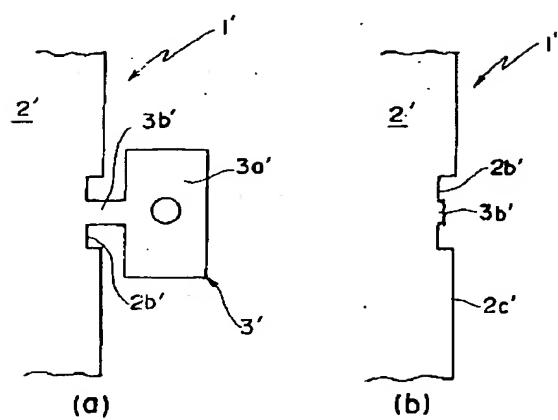
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## Drawing selection drawing 6



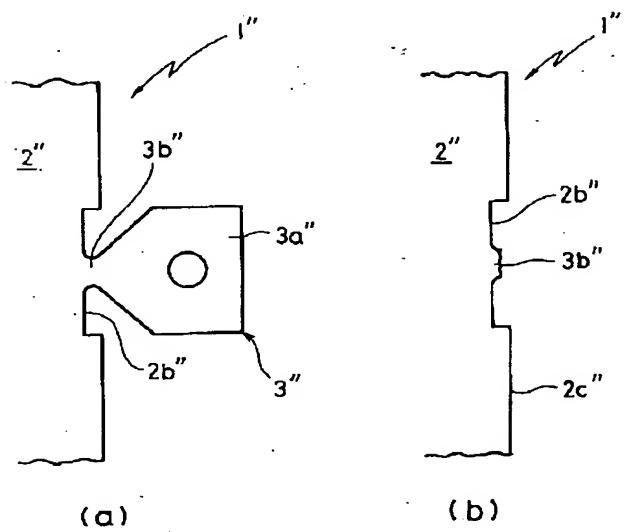
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Drawing selection drawing 7



[Translation done.]

Drawing selection drawing 8



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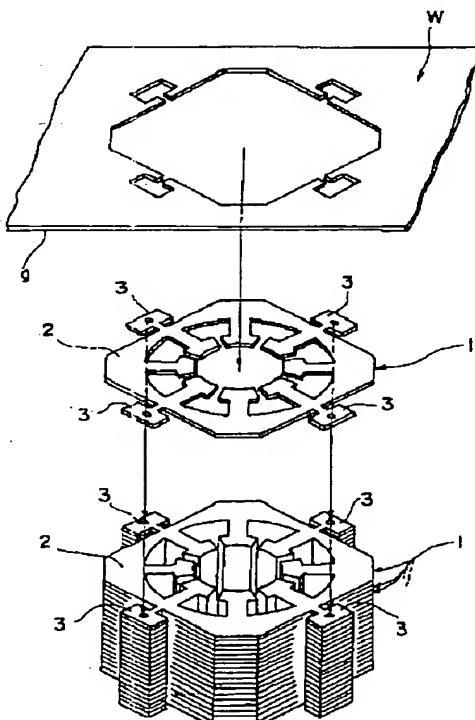
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(54) 【発明の名称】 積層鉄心の製造方法

(57) 【要約】

【課題】 本発明の課題は、積層した鉄心片同士を接着結合して成る積層鉄心を、寸法精度や電気的特性の低下を招くことなく確実に製造し得る、積層鉄心の製造方法を提供することにある。

【解決手段】 本発明に関わる積層鉄心の製造方法は、表面に熱硬化性接着剤 g を塗布した帯状鋼板 W から鉄心片本体部 2 と接合部 3 とを有する鉄心片 1 を打抜き形成するとともに、前記鉄心片 1 と該鉄心片 1 に当接する他の鉄心片 1 とを各々の接合部 3 をカシメ結合して互いに連結する工程と、所定枚数の鉄心片 1 を互いに連結して積層したのち熱硬化性接着剤 g を硬化させて鉄心片 1 を互いに接着結合する工程と、鉄心片 1 同士を互いに接着結合したのち鉄心片本体部 2 から接合部 3 を除去する工程とを含んでいる。



## 【特許請求の範囲】

【請求項1】 表面に熱硬化性接着剤を塗布して成る材料板から、積層鉄心を構成する鉄心片本体部と該鉄心片本体部から突出した接合部とを有する鉄心片を打抜き形成するとともに、打抜き形成した上記鉄心片と該鉄心片に当接する他の鉄心片とを各々の上記接合部をカシメ結合することによって互いに連結する工程と、

所定枚数の前記鉄心片を互いに連結して積層したのち、上記熱硬化性接着剤を硬化させることにより、積層された所定枚数の前記鉄心片を互いに接着結合する工程と、所定枚数の前記鉄心片同士を互いに接着結合したのち、前記鉄心片本体部から前記接合部を除去する工程と、を含んで成ることを特徴とする積層鉄心の製造方法。

## 【発明の詳細な説明】

## 【0001】

【発明の属する技術分野】 本発明は、積層した鉄心片同士を接着結合して成る積層鉄心の製造方法に関するものである。

## 【0002】

【従来の技術】 電動機の固定子や回転子等の積層鉄心は、ダイおよびパンチを具備して成る金型装置により、帯状鋼板等の材料板から所定形状の鉄心片を打抜き形成し、所定枚数積層した鉄心片同士を互いに結合することによって製造されている。

【0003】 ここで、鉄心片同士の結合手段としては、カシメ結合が従来より採用されているが、鉄心片におけるカシメ部分の近傍に歪みが生じるため、積層された鉄心片同士の間に隙間ができてしまうことと併せ、製品としての積層鉄心にカシメ部分が存在していることで、積層鉄心における電気的特性に悪影響を及ぼす不都合があった。

【0004】 このような不都合を解消するべく、表面に熱硬化性接着剤の塗布された材料板から打抜き形成された鉄心片を、金型装置におけるダイの内部で所定枚数積層したのち、ダイに設けられたヒータで加熱して熱硬化性接着剤を硬化させることにより、積層された鉄心片同士を接着結合させる積層鉄心の製造方法が提供されている。

## 【0005】

【発明が解決しようとする課題】 ところで、上述した積層鉄心の製造方法において、材料板から打抜き形成された鉄心片は、ダイの内部において次々と積み重ねられて行くが、このとき積み重ねられた鉄心片同士は何ら結合されていないため、鉄心片同士が密着せずに隙間が生じる虞れがあり、鉄心片間に隙間が生じている状態で鉄心片同士を接着結合した場合、積層鉄心の寸法精度に狂いが生じるばかりでなく、電気的特性にも悪影響を及ぼす不都合があった。

【0006】 本発明の目的は上記実状に鑑みて、積層した鉄心片同士を接着結合して成る積層鉄心を、寸法精度

や電気的特性の低下を招くことなく確実に製造し得る、積層鉄心の製造方法を提供することにある。

## 【0007】

【課題を解決するための手段】 上記目的を達成するべく、本発明に関わる積層鉄心の製造方法は、表面に熱硬化性接着剤を塗布して成る材料板から、積層鉄心を構成する鉄心片本体部と該鉄心片本体部から突出した接合部とを有する鉄心片を打抜き形成するとともに、打抜き形成した鉄心片と該鉄心片に当接する他の鉄心片とを各々の接合部をカシメ結合することによって互いに連結する工程と、所定枚数の鉄心片を互いに接着結合する工程と、所定枚数の鉄心片同士を互いに接着結合したのち、鉄心片本体部から接合部を除去する工程とを含んでいる。

## 【0008】

【発明の実施の形態】 以下、実施例を示す図面に基づいて、本発明を詳細に説明する。図1ないし図7は、本発明に関わる積層鉄心の製造方法を、電動機における固定子（積層鉄心）の製造に適用した例を示している。なお、本発明に関わる積層鉄心の製造方法は、ダイおよびパンチを備えた図示していない金型装置において実施されることは言うまでもない。

【0009】 本発明に関わる積層鉄心の製造方法では、図1に示す如く、先ず材料板としての帯状鋼板Wから所定形状の鉄心片1を打抜き形成する。

【0010】 ここで、上記帯状鋼板Wには、その表面（裏面）に、例えばエポキシ樹脂系の熱硬化性接着剤gが、全面に亘って極く薄く塗布されている。

【0011】 一方、上記鉄心片1は、図1および図2に示す如く、鉄心片本体部2と4つの接合部3, 3, 3, 3とから構成されている。

【0012】 鉄心片本体部2は、製品としての積層鉄心100（図5参照）を構成する部位であり、コーナーの欠けた四角形状の外観を呈するとともに、中央部には多数の突極子2a, 2a…が設けられている。

【0013】 また、各々の接合部3は、鉄心片本体部2の各辺から突出する態様で形成されており、矩形状を呈するカシメ部3aと、このカシメ部3aと鉄心片本体部2とを繋ぐ細いリブ3bとから構成されている。なお、上記リブ3bの幅は帯状鋼板Wの板厚程度、本実施例においては0.5mm～0.7mmに設定されている。

【0014】 本発明の製造方法では、図1に示す如く帯状鋼板Wから所定形状の鉄心片1を打抜き形成するとともに、この打抜き形成された鉄心片1を、先に打抜き形成されてダイ（図示せず）に収容されている他の鉄心片1に積層し、かつ打抜き形成された鉄心片1と他の鉄心片1とを、各々の接合部3（カシメ部3a）同士をカシメ結合することによって互いに連結している。

【0015】 すなわち、鉄心片1を打抜き形成すると同

時に、他の鉄心板1への積層、および他の鉄心片1とのカシメ結合を実施している。

【0016】以下、帯状鋼板Wからの鉄心片1の打抜き形成を繰り返して、積層鉄心100を構成する所定枚数の鉄心片1、1…を積層する。

【0017】ここで、図3に示す如く積層された鉄心片1、1…の間には、熱硬化性接着剤gの層が介在しており、また隣り合う鉄心片1同士は互いにカシメ結合されているため、熱硬化性接着剤gは鉄心片1の表面に密着している。

【0018】なお、1個の積層鉄心100を構成する所定枚数の鉄心片1、1…のうち、最下位および最上位の鉄心板1を、他の積層鉄心を構成する鉄心板と分離させるための構成は、従来の製造方法と変わることはないので説明は省略する。

【0019】所定枚数の鉄心片1、1…を積層したのち、金型装置におけるダイの内部に設置した加熱用ヒータ(図示せず)で、熱硬化性接着剤gを硬化させることにより、積層された鉄心片1、1…を互いに一体に接着結合して、図4に示す如き組立体10を製造する。

【0020】次いで、金型装置(図示せず)から組立体10を取り出したのち、この組立体10における鉄心片本体部2から各接合部3、3…を除去する。ここで、各接合部3、3…は、細いリブ3bを介して鉄心片本体部2と繋がっているだけなので、カシメ部3aを挟ってリブ3bを破断することにより、接合部3を鉄心片本体部2から容易に折り取ることができる。

【0021】このように、組立体10の鉄心片本体部2から各接合部3、3…を除去することにより、図5に示す如き最終的な製品としての積層鉄心100が完成する。

【0022】上述した如く、本発明に関わる製造方法では、帯状鋼板Wから鉄心片1を打抜き形成すると同時に、この鉄心片1を他の鉄心板1とカシメ結合しているので、積層した状態において隣接する鉄心片1同士は、熱硬化性接着剤gを介して互いに密着することとなり、もって鉄心片同士が密着していないことに起因する、寸法精度や電気的特性の低下を未然に防止することができる。

【0023】また、上述した如く、組立体10の鉄心片本体部2から、カシメ結合されている各接合部3、3…を除去しているので、製品としての積層鉄心100にカシメ部分が存在することはなく、もってカシメ部分の存在に起因する、積層鉄心における電気的特性への悪影響が発生することもない。

【0024】また、上述した実施例では、積層された鉄心片1、1…を互いに接着結合するべく、ダイの内部に設置したヒータによって加熱しているが、所定枚数積層された鉄心片1、1…は、カシメ結合によって一体に連結されているので、金型装置から取り出して加熱するこ

とが可能である。

【0025】このように、所定枚数積層された鉄心片1、1…を、金型装置から取り出して加熱処理することにより、加熱用ヒータを備えた特殊な金型装置を必要とせずに積層鉄心を製造することができ、もって製造設備の大型化や、製造コストの増大を可及的に抑えることが可能となる。

【0026】図6および図7に示す鉄心片1'は、鉄心片本体部2'と4つの接合部3'、3'…とから構成され、鉄心片本体部2'は四角形状の外観を呈するとともに中央部に多数の突極子2a'、2a'…が設けられており、各々の接合部3'は矩形状を呈するカシメ部3a'と細いリブ3b'とから構成され、各接合部3'は鉄心片本体部2'の各辺に設けた凹部2b'から突出して形成されている。なお、上記リブ3b'の幅は帯状鋼板Wの板厚程度、本実施例においては0.5mm～0.7mmに設定されている。

【0027】ここで、上述した鉄心片1'を使用した積層鉄心の製造方法も、図1から図5に示した積層鉄心の製造方法と変わることではなく、製品としての積層鉄心の寸法精度や電気的特性の低下を未然に防止することができる。

【0028】さらに、上述した形状の鉄心片1'では、図7(a)の常態から、図7(b)の如く接合部3'を除去した際、折り取られたリブ3b'が鉄心片本体2'の外縁2c'から突出する事がないので、積層鉄心をケーシングに収容する場合、ケーシングと積層鉄心との干渉を防止することができる。

【0029】図8に示す鉄心片1"は、カシメ部3a"とネック形状のリブ3b"とから成る接合部3"が、鉄心片本体部2"の各辺に設けた凹部2b"から突出して形成されており、上記接合部3"の形状以外は、図6および図7に示した鉄心片1'と基本的に変わることはない。なお、上記リブ3b"の幅は帯状鋼板Wの板厚程度、本実施例においては0.5mm～0.7mmに設定されている。

【0030】ここで、上述した鉄心片1"を使用した積層鉄心の製造方法も、図1から図5に示した積層鉄心の製造方法と変わることではなく、製品としての積層鉄心の寸法精度や電気的特性の低下を未然に防止することができる。

【0031】また、上述した形状の鉄心片1"では、図8(a)の常態から、図8(b)の如く接合部3"を除去した際、折り取られたリブ3b"が鉄心片本体2"の外縁2c"から突出する事がないので、積層鉄心をケーシングに収容する場合、ケーシングと積層鉄心との干渉を防止することができる。

【0032】また、上述した鉄心片1"では、接合部3"がネック形状のリブ3b"を介して鉄心片本体2"と繋がっているだけなので、鉄心片本体部2"から接合

部3"を除去する工程は、リブ3b"を破断することによって極めて容易に実施することができる。

【0033】なお、上述した実施例では、略四角柱状の固定子を構成する四角形状の鉄心片本体部と4個の接合部とから成る鉄心片を例示したが、略円柱形状の固定子を構成する円盤状の鉄心片本体部に、適宜個数の接合部を設けて鉄心片を構成することも可能である。

【0034】すなわち、鉄心片における鉄心片本体部の形状は、製造しようとする積層鉄心の形状に基づいて決定され、鉄心片本体部に設けられる接合部は、鉄心片本体部の形状等、種々の条件に基づいて適宜に設定することができる。

【0035】また、本発明に関わる積層鉄心の製造方法は、電動機の固定子および回転子のみならず、I型やE型の積層鉄心等、様々な形態の積層鉄心を製造するための方法として有効に適用し得ることは言うまでもない。

【0036】

【発明の効果】以上、詳述した如く、本発明に関わる積層鉄心の製造方法は、表面に熱硬化性接着剤を塗布して成る材料板から、積層鉄心を構成する鉄心片本体部と該鉄心片本体部から突出した接合部とを有する鉄心片を打抜き形成するとともに、打抜き形成した鉄心片と該鉄心片に当接する他の鉄心片とを各々の接合部をカシメ結合することによって互いに連結する工程と、所定枚数の鉄心片を互いに連結して積層したのち、熱硬化性接着剤を硬化させることによって、積層された所定枚数の鉄心片を互いに接着結合する工程と、所定枚数の鉄心片同士を互いに接着結合したのち、鉄心片本体部から接合部を除去する工程とを含んでいる。上記構成によれば、材料板から鉄心片を打抜き形成すると同時に、この鉄心片と他の鉄心板とをカシメ結合によって連結しているため、積

層した状態において重なり合う鉄心片同士は、不用意な隙間を生じることなく熱硬化性接着剤を介して互いに密着することとなる。したがって、本発明に関わる積層鉄心の製造方法によれば、積層した鉄心片同士を接着結合して成る積層鉄心を、寸法精度や電気的特性の低下を招くことなく確実に製造することが可能となる。

【図面の簡単な説明】

【図1】本発明に関わる積層鉄心の製造方法を示す材料板および鉄心片等の概念図。

【図2】本発明に基づいて材料板から打抜き形成された鉄心片を示す平面図。

【図3】本発明の製造方法における鉄心片の積層状態を示す概念図。

【図4】本発明に基づいて製造された組立体を示す外観斜視図。

【図5】本発明に基づいて製造された積層鉄心を示す外観斜視図。

【図6】本発明の製造方法における鉄心片の他の実施例を示す平面図。

【図7】(a)および(b)は、図6に示した鉄心片の接合部および接合部を除去した状態を示す要部平面図。

【図8】(a)および(b)は、本発明の製造方法における鉄心片の更に他の実施例を示す要部平面図。

【符号の説明】

W…帯状鋼板(材料板)、

g…熱硬化性接着剤、

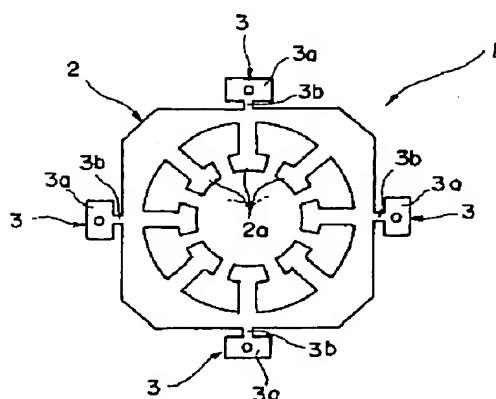
1, 1', 1"…鉄心片、

2, 2', 2"…鉄心片本体部、

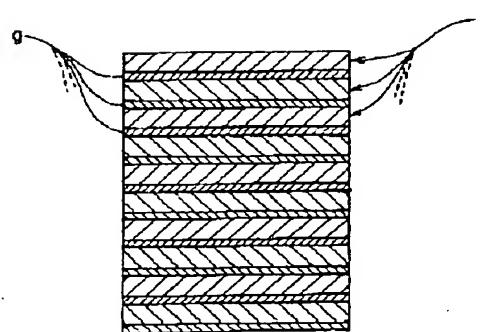
3, 3', 3"…接合部、

100…積層鉄心。

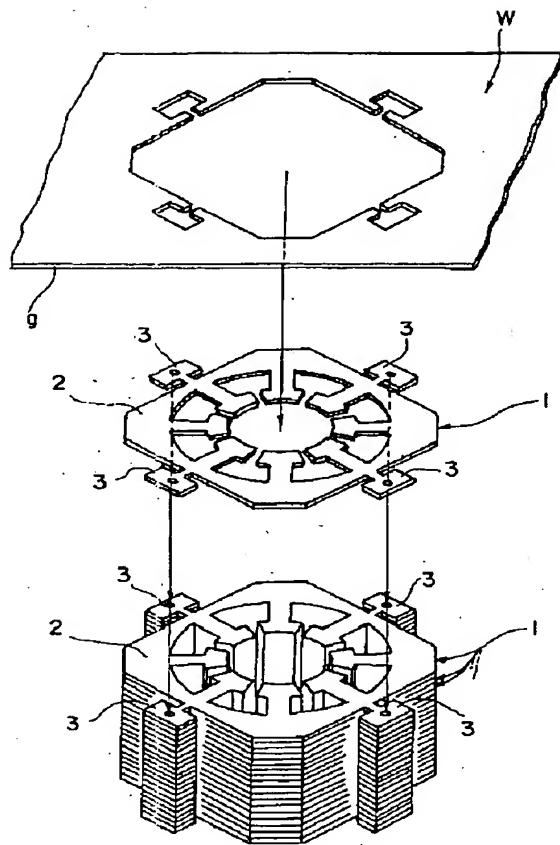
【図2】



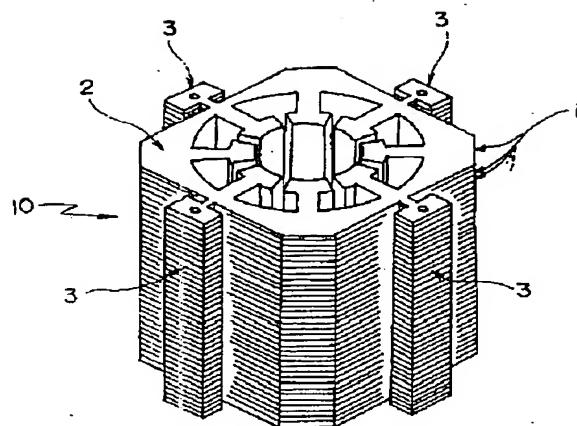
【図3】



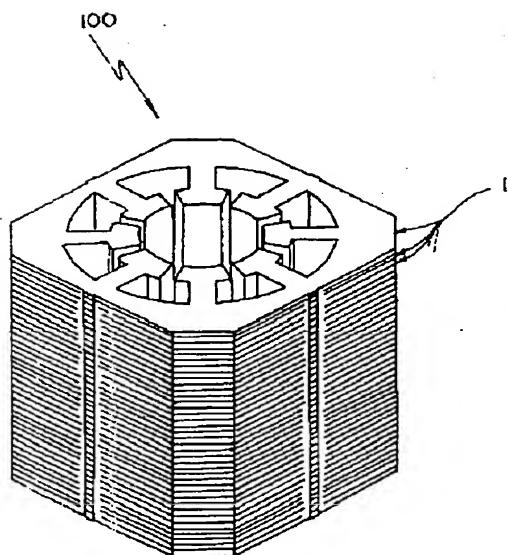
【図 1】



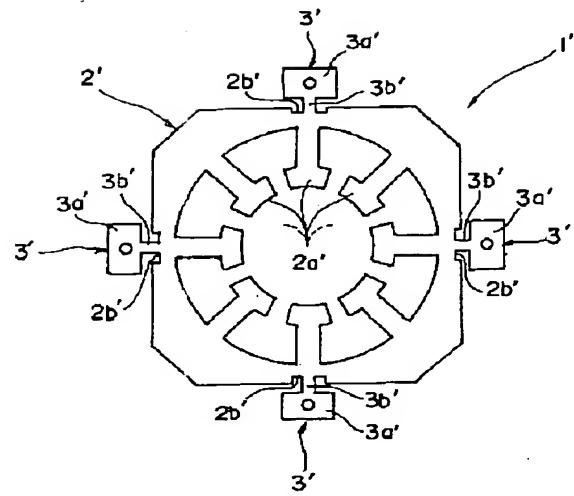
【図 4】



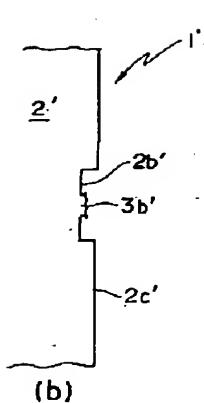
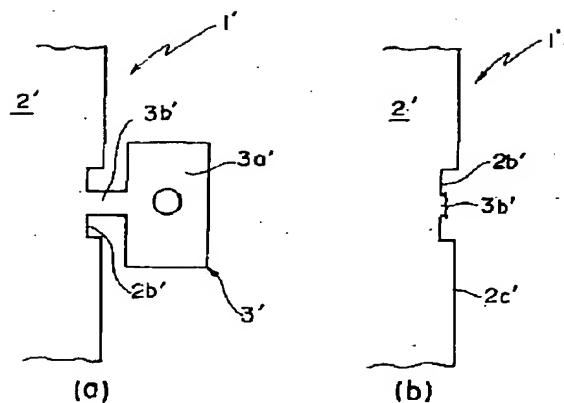
【図 5】



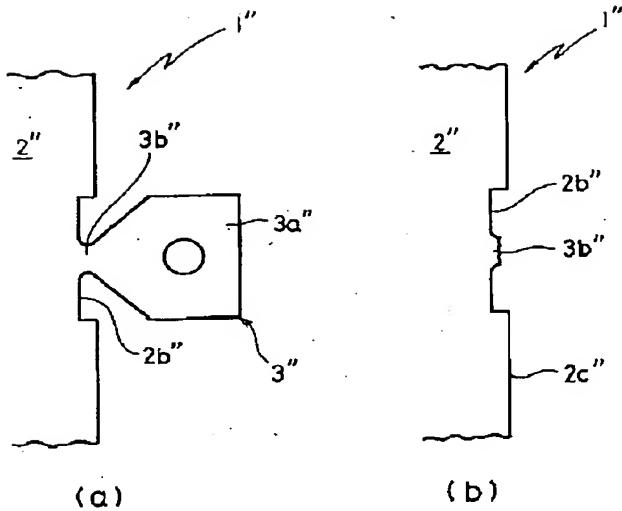
【図 6】



【図 7】



【図 8】



(a)

(b)

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